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Socioeconomic Impacts of Infrastructure Investment in Eswatini: The Case of LUSIP

A thesis submitted in partial fulfillment
of the requirements for the degree of
Master of Science in Agricultural Economics

by

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Abstract

The 2016 Eswatini Vulnerability Assessment Report indicated that over half of the Eswatini population required livelihood support due to the severe El Niño drought. Since agriculture is the backbone of Eswatini's economy, investments in climate change mitigation are needed in order to help protect the agriculture sector and associated livelihoods from increased yield and profit variability associated with future droughts. The IPCC (Intergovernmental Panel on Climate Change) estimates climate change in Eswatini could reduce rain-fed agricultural yields by up to 50%, threatening the ability of Eswatini to be food secure. As such, investing in water capture systems could help mitigate changes to both the amount and frequency of rainfall. Investments in water storage could be viewed as a type of food security insurance in the Eswatini context.

The Government of Eswatini commissioned the construction of the Lubovane Dam in 2003 to provide water, both for agricultural and household usage, as part of the Lower Usuthu Irrigation Project (LUSIP). LUSIP aimed to provide irrigation water for 11,500 ha by 2015. LUSIP was also forecasted to provide an additional 750,000-person days /year of on-farm employment mainly on sugarcane, banana, and maize fields and 36,000 days of non-farm employment/year in the new businesses and services that would have emerged after its completion in 2010. Eswatini had to allocate limited public funds for the implementation of LUSIP and without tangible evidence on the returns on investment, obtaining funding or future irrigation projects could be -difficult. As such, in 2018 the Swaziland Economic Policy Analysis and Research Centre (SEPARC) set out to estimate the benefits of LUSIP in the town of Siphofaneni using a comprehensive survey. Using the data collected by SEPARC this study set out to validate the LUSIP impact through social, economic and environmental metrics. The

survey results suggest that LUSIP has provided employment opportunities, increased wages and incomes, thus increasing the people's ability to save. The survey also found that the increased income and savings appeared to lead to increased food security as more people can now afford purchase their basic food needs as water is now more readily available throughout the year.

Dedication

To my beloved family,

Every step and decision I took I carried my family in my thoughts. This achievement is not just mine, it has the whole family behind it, for that I am very thankful and grateful to have such an amazing support system that never left my side. I want to thank my parents for being there for me through every step of the way and believing in me, even in times where I didn't believe in myself. I want to thank my brothers for supporting me throughout the years and looking out for me, teaching me how to depend on myself, and most importantly being there at any time of the day to support me.

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Literature Review

The Kingdom of Eswatini

The kingdom of Eswatini (Eswatini) is a landlocked country in Southern Africa covering an area of 17,364 km², nearly enclosed within South Africa and sharing a portion of its northeastern border with Mozambique. Eswatini's population is estimated at 1.1 million with a low population growth rate, for a lower middle income country of 1.08% (World Bank, 2017). The low growth rate can be attributed to the fact that Eswatini has the highest HIV/AIDS adult prevalence rate (26%) in the world (CIA, 2017). HIV in Eswatini contributes to high levels of mortality; lower life expectancy, higher infant mortality, lower population growth rates, and changes in the distribution of population by age and sex (CIA, 2017).

Food Security

Based on the 2016 Human Development Index (HDI) report, Eswatini was ranked 148th of 188 countries listed. Although Eswatini is ranked as a lower middle-income country, income inequality is relatively high resulting in a Gini coefficient of 0.52. It is ranked according to the Gini Index as 9th in the world in terms of inequality, with 63% of Swazis living below the national poverty line, making less than 2 dollars per day (World Bank, 2017).¹ In the 2017 Global Hunger Index (GHI), Eswatini ranked 71 of 119 countries resulting in the food and nutrition situation in Eswatini being classified as “serious”, which indicates alarming, or extremely alarming hunger levels (GHI, 2017). Recently, erratic climatic conditions have contributed to the impoverished conditions as droughts have caused over 15 years of food shortages and high variability in staple food prices (VASUDEVA, 2006). Climate, HIV and poor

¹ The Gini index measures the extent to which the distribution of income among individuals or households within an economy deviates from a perfectly equal distribution

food management programs are also to blame for decrease of agricultural production since the early 2000s and worsened after the El Niño drought in 2014/15 (VASUDEVA, 2006; SEPARC, 2018).

Health

Health issues also play a vital role in the reduction of food productivity. Eswatini currently has the highest rate of HIV/AIDS (32%) and Tuberculosis (26%) in the world (World Bank, 2017). Nearly half (47.8%) of all women are HIV positive and constitute over 80% of tuberculosis patients (CIA, 2017). Having unhealthy parents, due to malnutrition and minimal access to health care, leads to stunting of children which can cause numerous health problems for the population such as fatigue and a weaker immune system limiting the ability to work under harsh climate conditions (World Bank, 2011). In 2017, it was reported that 31% of children and 45.6% of adults are underdeveloped in terms of BMI in Eswatini (Body Mass Index) (FAO, 2017). Health issues, such as low consumption of vitamin A, poor water sanitation and hygiene, lack of access to nutritious foods, and high HIV and Tuberculosis cases, and environmental issues, such as droughts, contribute not only to high mortality rates but slow economic growth since unhealthy workers are physically and mentally less energetic and are also more likely to be absent from work because of illness (or illness in their family) (Bloom, Canning, & Sevilla, 2011).

Economy and role of agriculture

After gaining independence in 1968 from the British Empire, the Kingdom of Eswatini experienced diversified economic growth that focused on agricultural growth in sugarcane, maize, and cotton, and pursued policies that pushed towards foreign and private investments.

There was large economic growth (1.9%) in the industrial sector leading to Eswatini ranking 9th among the African countries in terms of GDP per capita (3051.6 USD) in 2017 (World Bank, 2017). Eswatini agriculture contributes the third highest percentage, (6.4%) to the economy after the services sector (48.6%) and manufacturing sector (45%) (World Bank, 2017). The agricultural sector is diverse with sugarcane, cotton, maize, sorghum, peanuts, tobacco, cattle, goats, sheep, pine and eucalyptus, pineapples, oranges, grapefruit, and citrus fruits as its primary crops. Given its diverse landscape, with forested and grassy highlands in the west falling to the low-lying sugar and citrus plantations in the east, Eswatini has the ability to produce a wide variety of cash crops for export (SMoA, 2016). The agriculture in Eswatini is split between largely rain-fed subsistence production by smallholder farmers, that grow rain-fed maize and vegetables representing 90% of total smallholders, and cash cropping with available irrigation on large private estates (FAO, 2018) (World Bank, 2011). The Eswatini agricultural sector is predominantly constituted by smallholder farmers, which make up 70% of the total Eswatini population; small scale producers account for 75% of the crop land but only account for 11% of total output (FAO, 2018). As such boosting productivity of small scale producers in an effort to lift them out of poverty is one of the most pressing challenges currently facing the government of Eswatini.

Drought in Eswatini

In 2015/16 the El Niño drought was the worst drought Eswatini has experienced since 1992 (SEPARC, 2018). In total nominal monetary terms, the drought cost Eswatini conservatively US \$306.8 million, representing a 7.01% of Eswatini's Gross Domestic Product (GDP) in 2016 or 18.58% of government expenditure in 2016 (SEPARC, 2018). Despite the significant drought losses in terms of agricultural production, the country has a functioning

Disaster Risk Management (DRM) Policy (2010). However, even with extensive experience from past droughts in 2009/10, 2007, 2001, and 1992, the country is still struggling to better cope with the effects of drought with respect to economic stability, food price stability and food security. Droughts hit Eswatini particularly hard because of its reliance on surface water (mainly rivers) to provide irrigation for cash and staple crops. Due to chronic drought-like conditions in the Shiselweni and Lubombo regions households in these regions are now discouraged from participating in agriculture (ADB, 2016). Because of households' reduced participation on agriculture, Eswatini is now heavily dependent on the international, predominately South African, market to fill its basic food needs. Given that Eswatini is a relatively small country and its droughts also have high correlations with South African droughts, relying so heavily on imported food from South Africa can pose food security issues. The implication is that as droughts become more frequent regionally, their impact on the Eswatini economy could be severe, particularly on rural livelihoods who rely on substance agriculture (SEPARC, 2018). The Eswatini Vulnerability Assessment Report in July of 2016 indicated that more than half of the population in the country (638,251 people) required livelihood support, mainly in the form of food aid due to the El Niño drought. Hence, to adequately prepare Eswatini for future droughts, the implementation of the DRM policy could focus on strengthening water harvesting and storage infrastructure to increase food crop production under irrigation, during times of drought (GoKS, 2007). Investments in water storage could be viewed as a type of food security insurance in the Eswatini context.

In Eswatini water is a lubricant of the economy and droughts disrupt economic activities and sever lifelines for many rural communities in the country whose livelihoods depend on rain-fed agriculture. The El Niño drought of 2016 became an added pressure on limited government

resources exacerbating endemic challenges in the country, such as food insecurity and poverty (FAO, 2018). As a result of the 2016 El Niño event, the Government of Eswatini and international development partners had no option but to reroute resources intended to fund implementation of development projects to help mitigate the impacts of the drought. The National Emergency Response, Mitigation and Adaptation Plan (NERMAP) raised 41% (US\$39.1 million) of the required US\$96 million for food and infrastructure such as dams for potable water. A total of 413,553 people benefited from NERMAP against an initial targeted need of 350,000. Of these beneficiaries, 323,874 received direct food aid while 89,679 received cash stipends for food. A total of 369,414 people benefited through NERMAP on potable water provision, sanitation services, and hygiene promotion services (SEPARC, 2018).

Impact of drought on agriculture

The literature on drought is deep on the effects of the negative effects (food security and economic wellbeing) via agricultural production. Desai et al. (1979) argued that droughts lead to unstable agricultural incomes against rising food prices, which in turn intensify the incidence of poverty and vulnerability of the poor. Though impacts of drought can generally be anticipated on agriculture, the reality is that each new drought presents a set of unique impacts on the eSwatini economy. These effects can manifest themselves at the household level in different venues, all of which end in increased food insecurity. Equally, the capacity of households and the economy at large to absorb, ease, or respond to drought impacts depends on the prior socioeconomic conditions of households and the existing disaster risk management structures and policies enabled in the country (GoKS, 2007). The socioeconomic assessment of drought is especially important for the agriculture sector because the NDS views agriculture as the economic engine that can lift a substantial number of people out of poverty in Eswatini. Investments in the

agricultural sector can also contribute reducing economic inequality between urban elite and rural poor and increase opportunities for inclusive economic growth (SEPARC, 2018). (SWADE, 2016). Since agriculture is the backbone of Eswatini's economy, investments in climate change programming, such as drought mitigation, are needed in order to help protect the agriculture sector and associated livelihoods from future from high yield and profit variability. Droughts and variable weather patterns will only continue to increase in frequency and magnitude (IPCC,2007).The implication for Eswatini is that yields from rain-fed agriculture could fall by up to 50% by 2020, threatening the livelihoods of the rural poor, a majority of whom earn their living through subsistence agriculture (IPCC 2007, IPCC, 2016). Thus, investments in water capture could help mitigate future losses associated with droughts and more sporadic rainfall. Total rainfall can be deceiving as agricultural output in Eswatini is a function of total rainfall as well as the timing of that rainfall. Climate change can reduce total or change frequency of rainfall. As crops, specifically maize, are planted on anticipated rainfall patterns, if traditional rainfall patterns change it could lead to increased yield variability. As such, investing in water capture systems could help mitigate changes to both the amount and frequency of rainfall.

The El Niño drought 2014/2015 tested the country's infrastructure to harvest and store water. The drought affected water quantity and quality in the country's riverine systems (rivers, dams, and reservoirs). Cases of diarrhea, dysentery, and other stomach ailments due to poor sanitation affected children as they consumed untreated dirty water given the short supply of potable water. Some water bodies, such as the Hawane Reservoir, completely dried-up (FAO, 2016). Water provision to rural households, major towns, and agricultural estates became a critical impediment for the development of Eswatini's agricultural economy. (SEPARC, 2018).

Urban areas, particularly Mbabane, were without water for the first time since the 1980s (VASUDEVA, 2006). Consequently, the Eswatini Water Services Corporation (SWSC) had to execute intensive water rationing in Mbabane for four consecutive days in a week. In addition, SWSC and the government commissioned the dredging of Hawane Reservoir and also began constructing a water pipeline from Luphohlo Dam to supply water directly to Mbabane at a cost of US\$8.8 million. Within the Central Business District (CBD) in Mbabane, SWSC extended the Mbabane River Water Abstraction System through construction of a treatment plant (at a cost of US\$8 million) to maintain water supply to the businesses in the CBD (SEPARC, 2018). Due to the extreme water shortages, many households were forced to exit agriculture, thus hampering the food production system and more than doubled the food insecure population in the country to 638,251 in 2016/17 from 308,059 people at the onset of the 2014/2015 drought. Households were forced to seek financial assistance from their friends and families to remain food secure. Some households had no option but to resort to extreme coping strategies such as reducing the amount of food they ate each day, while others turned to less preferred and less nutritious, cheaper food to survive during the drought (SEPARC, 2018).

Eswatini's total maize requirement is estimated at 172,170 tons, including just over 109,000 for human consumption. In 2015 maize harvest was estimated 81,623 tons, 47% of the total demand, due to El Niño drought (FAO/WFP, 2015). The sharp decrease in 2015 maize production increased overall food insecurity in Eswatini as maize is the staple crop of the vast majority of Swazi's. The high dependence on rain-fed maize production, especially in marginal areas farmed by the poorest of the poor, and poorly integrated food markets coupled with high import prices of food (all Southern Africa experienced the same drought) led to elevated food

prices and resulted in a spike in regional food insecurity (Terry & Ogg, 2017).² Maize production dropped by 67%, from 101,000 tons in 2014/15 to 33,000 tons in 2015/16. The National Maize Corporation (NMC), also known as the country's staple food bank, had to import 30,446 tons of maize from South Africa at elevated prices as South Africa was also experiencing the same drought. This contributed to substantial increases in maize prices throughout Eswatini. A ton of maize increased by 66% from US\$282 in 2015 to US\$468 at the beginning of 2016 (CBS, 2016; NMC, 2016). Likewise, food inflation jumped from 4.3% in March 2015 to 19% in December 2016, pushing many households into food insecurity (SMoA, 2016).

The two largest cash crops, sugar and cotton, also felt the economic impact of the drought. Cotton is predominantly grown in the Lubombo and Shiselweni regions and is an income generator for many households in these poverty-stricken regions. Due to the drought, cotton production dropped by nearly 90% from 873 tons to 100 tons in the 2015/16 growing season (SMoA, 2016). Cotton producers lost an estimated USD\$ 319 million in potential earnings. In the cotton industry the drought led to job losses especially in cotton gins, which were operating below 10% of their capacity.

The sugar industry reported a financial loss of US\$9.5 million due to increased operational costs during the drought and affected wage labor for seasonal workers in the sugar industry (GoS, 2016). The sugar industry is a vital contributor to the Eswatinieconomy accounting for almost 60% of the total Eswatiniagricultural output, 10% to the country's Gross Domestic Product, as well as at least 16% to national employment. For the 2015/16 growing season, sales estimates from the Southern African Customs Union (SACU) predicted a 5% drop

² Other major maize exporters (The United States, Brazil and China) do not serve the Eswatini market as these exporters produce yellow maize, where in Eswatini consumers demand white maize.

while export sales outside the SACU region forecast a 45% plunge. Total losses to the industry due to the drought could amount to US\$80 million (SEPARC, 2018).

Impact of drought on livestock

The El Niño drought also had negative impacts on livestock production in Eswatini. Livestock are culturally important to the people of Eswatini, and livestock capital accounts for 18% of agricultural output (FAO, 2016). Tribal beliefs in Eswatini associate cattle with wealth; and when the drought hit in 2015/16, pastures and water availability were so adversely affected that it led to the death or premature slaughter of 80,000 head of cattle (FAO, 2016). This loss was estimated to cost 45 million USD and approximately 14% of the national herd died due to the lack of water and diminished grazing land. At one point, the country had to import hay bales from South Africa because of the deteriorated rangelands. Farmers faced a difficult dilemma of either holding their cattle herd or selling to commercial abattoirs. Those who took timely decisions to destock reduced their losses but also received low prices as the market was flooded with other producers acting the same. Conversely, farmers who held on to their cattle into the heat of the drought received low prices at abattoirs, as little as US\$120 per cow as meat quality diminished due to lack of cattle feed. Furthermore, the Eswatini Meat Industries reported that about 33% of the beef exports to the Eurozone had to be downgraded to low quality beef, thus depriving the country of potential export earnings (SEPARC, 2018).

Impact of drought on health

The drought had serious impacts spanning beyond agriculture. The Eswatini Comprehensive Nutrition Health Survey Report (February 2017) indicated that the most drought-related illnesses reported among households were diarrhea (16.1%), skin diseases (15%), upper

respiratory tract disease (14.6%), and eye disease (12.2%). Diarrhea was prevalent in all the four regions of Eswatini, whilst skin diseases were most prevalent in Manzini (17.4%) and Lubombo (17.2%), and the Lubombo region reported the most cases of upper respiratory track disease in 18.7% of the households surveyed. In terms of long-term chronic diseases, the results of the Rapid Nutrition and Health Assessment (2016) revealed a gradual increase in the overall monthly number of cases of anemia diagnosed in the health facilities during the drought period, including an increase in the number of clients admitted in the Food by Prescription Program. The assessment also found that Antiretroviral Treatment and TB treatment defaulter rates increased during the drought. Extensive water depletion across the country had a significant impact on school operations and attendance. Data from the Education Sector Assessment showed that 47% of schools had cases of learner absenteeism attributed to the drought (SWADE, 2016). On the same note, about 10% the sampled schools experienced teacher absenteeism for reasons related to the drought. Most schools in the Mbabane-Ngwenya corridor did not have alternative water, sanitation, and hygiene facilities such as ventilation improved pit latrines and water-harvesting facilities, and so experienced heightened sanitation problems. In rural areas where most households depend on subsistence agriculture for their basic food needs, food shortages from poor yields necessitated expansion and strengthening of the school-feeding program to ensure that learning was not disrupted. The government's school-feeding program had to be supplemented, strengthened, and extended to all schools in the country by supplying food commodities for breakfast (SEPARC, 2018).

The Lubombo region characteristics

In 2017, the Lubombo region of Eswatini was home to 19.2% of the Eswatini population (CSO, 2017). The region is also home to some of the most productive agricultural soils in the country. However, while the region is endowed with fertile soil, climatically it's semi-arid and can be susceptible to prolonged droughts. As such, investments in infrastructure, such as dams, could be crucial for stimulating economic activity and for rural development in an area with such agricultural potential. In Siphofaneni, a town in the Lubombo region where the Lubovane Dam is located, the main source of economic activity is agriculture, mainly sugarcane. The 2007 Eswatini Population and Housing Characteristics indicate that out of the 21,698 heads of household in Lubombo, 22.7% of them were directly employed in the agricultural sector while 17.4% and 8% of the household heads were employed in the manufacturing, and wholesale and retail trade, respectively. Agricultural producers in the region produce a wide range of agricultural commodities including summer grain crops, sugarcane, an assortment of fruit trees, and livestock (GoKS, 2007).

Importance of Infrastructure Investments on Increasing Returns in Eswatini

A well-developed infrastructure system has an important role in stimulating economic development and enhancing increased levels of productivity, income and consumption that can ultimately lead to an improvement in the standard of living of the poor (Buchner, Kaserer, & Schmidt, 2008). In that sense, the development process is dependent on the provision of infrastructure, sufficient transport, communications, information and marketing facilities at each level of the economy. In this sense, development of infrastructure is crucial in the fight against poverty (Buchner, Kaserer, & Schmidt, 2008). Rural infrastructure can be seen as the complex

mix of physical structures or networks within which social and economic activities are executed. In the Swazi context, these structures are not ends in themselves, but are means to achieving the broader goals of economic growth, food security and poverty reduction. Infrastructure contributes to these goals by providing essential services such as transportation for goods and services, the transmission and communication of knowledge and information to the people who are out of reach of any of good and services that are in other areas. Thus it is the provision of infrastructure that will result to a meaningful and effective economic and social transformation (GoKS, 2007).

Improved infrastructure, such as paved roads and irrigation can facilitate the performance of the private sector and enables forward and backward linkages (between public and private entities) with activities conducted by Small and Medium Enterprises (SMEs) and the poor (World Bank, 2011). (GoKS, 2007). Approximately 43% of the rural population is poor in Eswatini compared to 30% of the urban population with the depth and severity of poverty being a larger burden in the rural areas. In Eswatini, there is also a high occurrence of poverty in Peri-urban areas located in rural—urban transition zones, linking between the villages and cities, where the urban poor are mainly found (World Bank, 2011). The urban poor in Eswatini lack infrastructure, such as roads and irrigation, and find services, such as health and food services, unaffordable and thereby inaccessible (GoKS, 2007). Poor infrastructure affects the development of the poor as producers, consumers and workers as it denies them the opportunity to contribute to the social and economic development of Eswatini and deprives them of the benefits of economic growth (GoKS, 2007).

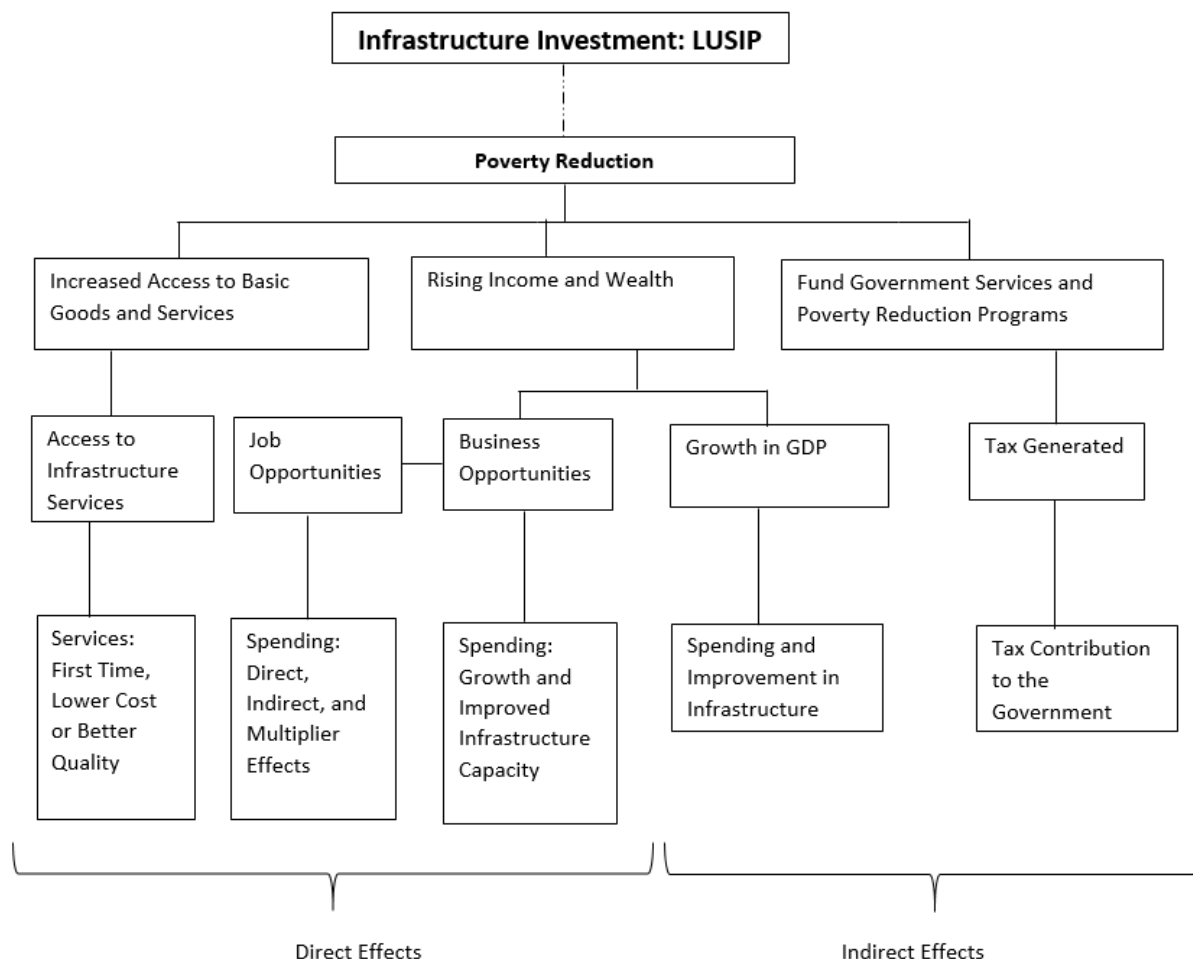


Figure 1: Infrastructure with Direct and Indirect Links to Poverty Reduction

LUSIP (Lower Usuthu Smallholder Irrigation Project)

The Government of Eswatini commissioned the construction of the Lubovane Dam in 2003 to provide water for the first phase of the Lower Usuthu Irrigation Project (LUSIP) in an effort to reduce poverty and increase investment into pro-poor infrastructure projects to help rural households produce their way out of poverty (IFAD/SWADE, 2014). The Lubovane Dam,

the main dam in LUSIP, located in the town of Siphofaneni in the Lubombo region in central Eswatini, was completed in 2009. The objective of the LUSIP is to reduce poverty and stimulate continuous improvement in the standard of living of the population in the Lower Usuthu Basin (LUB) of Eswatini through the commercialisation and intensification of irrigated agriculture. The project's short-term objectives were twofold, (1) the Eswatini government sought to integrate smallholder agricultural producers into the commercial economy through the provision of irrigation infrastructure and (2) an enabling environment (including institutions, legal framework, and policies) for smallholder agriculture to thrive (ADB, 2016). The Government of Eswatini entrusted the Eswatini Water and Agricultural Development Enterprise (SWADE), to overlook the work of LUSIP (IFAD/SWADE, 2014) . The SWADE is a parastatal that was created to build capacity amongst smallholders to use water, climate, soil, and a variety of inputs to produce their way out of poverty, start commercial agricultural enterprises, and stimulate economic growth,.

The Lower Usuthu Basin region is one of the poorest regions in Eswatini with an average per capita income half (USD 324) of what the average Eswatini per capita income is (USD 646) (World Bank, 2017). The Lower Usuthu Basin region is characterized as a predominately agricultural area, mainly with sugarcane and maize production, defined by a lack of stable irrigation water in dry season from mid-April to mid-October. One of the primary goals of LUSIP was to address the water constraint in the dry season by storing flood water in an off-river 155 million m³ reservoir at Lubovane dam of the Lower Usuthu River. LUSIP aimed to provide irrigation water for 6,500 ha in the Lower Usuthu Basin after the completion of its first phase (2002-2010) and additional 5,000 ha after the completion of the second phase by 2015. The objective of the LUSIP in this area was specifically to reduce poverty and to improve the

standard of living of the smallholder farmers in the Lower Usuthu Basin by the commercialization and intensification of irrigated agriculture of sugarcane through a gradual withdrawal from the subsistence farming of maize predominately practiced in the region (GoKS, 2007). The project commenced with the construction of three dams, a masonry digression dam on the Lower Usuthu River at Bulungapoort, an intake and a sand trap to divert Lower Usuthu river water into a feeder canal which leads to the off river Lubovane Reservoir (VASUDEVA, 2006). The Lubovane reservoir was formed by constructing three dams, first Roller Compacted Concrete (RCC) dam on river Mhlathuzane, second rock-fill dam on river Golome and the third a low level saddle dam. The three dams together formed an off-river reservoir impounding water that was diverted from wet season which extends from mid-October to mid-April that flows in the Usuthu River which was designed to irrigate 11,500 ha of agricultural lands; around 51% of the target was achieved in Phase 1 of the project in 2010. From this a total of 6,500 ha were irrigated including 3,050 ha of sugar cane and 321 ha of alternative crops, such as bananas, maize, and small vegetable gardens. By May 2014, 15,202 people had benefited directly through immediate access to water, mainly for agricultural irrigation, with a further 5,277 benefiting indirectly with new services and businesses emerging in the region such as banks, supermarkets, clothing retailers, funeral parlors, and schools which developed through the economic activity the irrigation water provided through increased agricultural output (IFAD/SWADE, 2014).

One of the goals of LUSIP was to provide an additional 750,000-person days /year of on-farm employment mainly on sugarcane, banana, and maize fields and 36,000 days of non-farm employment/ year in the new businesses and services that emerged after the completion of LUSIP by 2010 (ADB, 2016). In addition, significant indirect benefits such as micro business

development, micro industrial growth, transport development, farm machinery and repair business, trading business, labor demand and generous social benefits were also expected from this the boost in agricultural productivity brought about by the introduction of a stable water supply. On the outset of the project, the main beneficiaries of LUSIP were anticipated to be the 2,600-farm households (15,300 persons) who were expected to have their standard of living raised through the introduction of commercially irrigated sugarcane which could increase the average agricultural producer's income by up to 500% (IFAD/SWADE, 2014). In addition, these 2,600 households were expected to have access to an improved water supply and sanitation, drinking water and improved health facilities such as pharmacies and health centers (VASUDEVA, 2006). This study will attempt to analyze whether LUSIP was successful in achieving their initial goals of poverty eradication and economic development.

The 2010 Eswatini Household Income and Expenditure Survey (SHIES) indicates that at the inception of the LUSIP, households in the town of Siphofaneni, where LUSIP was implemented, produced below country average levels of food such as maize and vegetables due to the shortage of available irrigation water. Prior to the establishment of the LUSIP dam, the entire constituency of the Lubombo region had limited roads and irrigation infrastructure. During the process of constructing LUSIP, the government paved new roads in order to facilitate the reach of trucks to the project site, and these roads are now used to connect the town in the district with each other and with other neighboring villages.

Given the high correlation between favorable climatic conditions and food security the living situation is markedly worse in the drier region of the Lubombo Plateau, where the rate of severe food insecurity reached 11.3% in addition to 28.2% classified as moderately food insecure in 2015 (FAO/WFP, 2015). With the lower agricultural yields, primarily maize, due to the recent

(2015/2016) droughts Eswatini have experienced an increase in food prices (SMoA, 2016). After the increase of food prices following the drought, the Government of Eswatini (GoS) internalized that developing functional irrigation systems through investing in water related infrastructure projects such as dams were vital for the agricultural sector and for stabilizing country-wide food prices (SMoA, 2016). Although informal trading routes through Mozambique and the border of Eswatini exist in the constituency of Lubombo and neighboring areas, such were used to meet intra-constituency food needs. Inter-country agricultural imports were met mainly through imports from South Africa (SHIES, 2010). This paper will lay out the argument that LUSIP has increased access to basic goods and services, an increase in business and job opportunities, also trying to prove an increase in income and wealth of the Siphofaneni residents.

The Role of Infrastructure Investment on Economic Growth

LUSIP can play an important role in the development and growth of Siphofaneni and the Lubombo region bringing irrigation water to enhance agricultural output. Public infrastructure such as roads, highways, airports, and port facilities are assumed to have positive direct and indirect effects on private and public sector output and productivity growth (Aschauer, 1989). The literature has come to the consensus that investment in infrastructure can lead to economic growth; however, the magnitude of that growth and causality remain subjects of debate (Crafts, 2009). The positive correlation between infrastructure investments and growth is summarized by the effect the investment of the government has by raising the returns of private investments in the long run (Barro, 1991). Figure 2 summarizes the linkages from infrastructure investments (areas of intervention) through determinants of productivity (areas of influence) to the poor's wages and employment (direct channel), and rural economic growth (indirect channel) that influences the supply and prices of basic goods. The final linkages are to real

income/consumption of the poor and, consequently, poverty reduction (area of concern). For example, investing in paved roads could result in an increase in agricultural productivity by reducing the time and cost of moving perishable agricultural goods to and from the market. This can increase nonfarm employment and productivity through easier access to jobs and other services. Raising the wages through increased demand on services and creating jobs, and increased employment of the poor with increased opportunities in various economic sectors such as agriculture and service, will enhance the country's economic welfare. This is the (direct) income distribution effect of infrastructure investment. In addition, higher productivity and expanded employment within an area will lead to higher economic growth, affecting the supply and prices of goods and, thus, the poor's well-being.

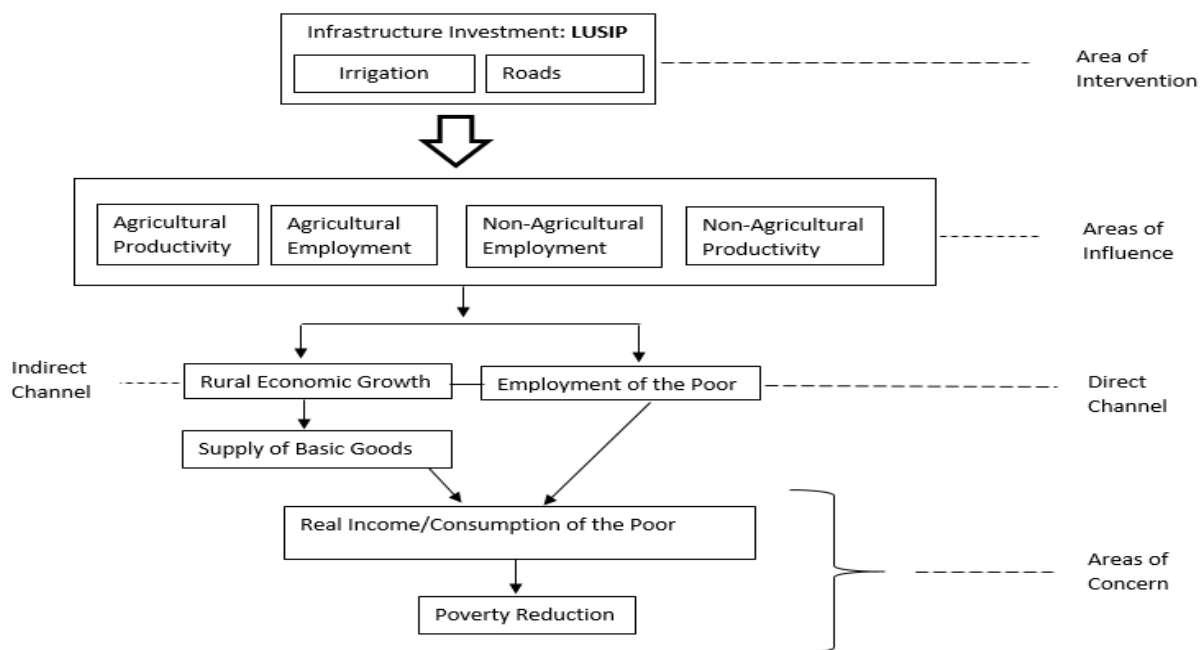


Figure 2: Analytical Framework Linking Infrastructure and Poverty Reduction

Objective and Relevance of the Research

Reducing poverty and food insecurity is a challenge confronting Eswatini both today and for the foreseeable future. The Government of Eswatini internalizes the inequalities that are prevalent in the country in terms of ownership and allocation of resources with regards to the cause of and the solution to poverty and increased food security (GoKS, 2007). In an effort to eliminate poverty, the government of Eswatini formulated a Poverty Reduction Strategy and Action Plan (PRSAP) as a main component in the operationalization of the National Development Strategy (NDS). The PRSAP is the foundation for Eswatini's development framework for poverty reduction and who has a stated goal is poverty reduction as a priority (VASUDEVA, 2006). Since all the development programs to be undertaken by the Eswatini government are required to have a poverty reduction component PRSAP will be implemented through different support mechanisms including the national budget and international organizations' experience such as the UNDP (VASUDEVA, 2006).

Like most governments, Eswatini must allocate limited funds for the implementation of the PRSAP and other publically funded projects and without tangible evidence as to what estimates of the return on investment are, obtaining funding for the project moving forward could be in jeopardy. Therefore, this study sets out to provide economic justification for approving the LUSIP in Eswatini based on its value of improving the standard of living the citizens of Eswatini. Studies like this can provide tangible information for the Eswatini government, NGOs and private donors on the impact of the LUSIP, which in turn can provide important information so each institution can make more informed investments in the future to help reduce poverty in Eswatini. Moreover, SWADE, whose mandate is to help in the creation of agricultural enterprises using water as a catalyst, will need to provide the Eswatini

government tangible facts and academic studies such as this can provide information that the potential economic benefits of their work is not a theory but can be tangibly assessed in the field.

In the spring of 2018 the Swaziland Economic Policy Analysis and Research Centre (SEPARC), proposed to undertake a study estimating the impacts of the LUSIP on the livelihoods of the populous located in town of Siphonaneni, one of the benefactors of LUSIP. SEPARC wanted to provide evidence based findings on the impact of the LUSIP on the livelihood of the residents Siphofaneni which was intended to provide important metrics on the effectiveness, or lack thereof, of the project in terms of poverty and food insecurity reductions. Further, the analysis was intended to provide evidence on the contribution of LUSIP in empowering rural households to generate income and increase food security and enhance their social development. The catalyst of the SEPARC survey was to provide important feedback to the Eswatini government as the country embarks on expanding the implementation of its Poverty Reduction Strategy and Action Plan (PRSAP). An impact assessment study such as the one conducted here is also beneficial as a starting point to open discussions on whether the LUSIP and SWADE projects are meeting the outlined goals of food security and poverty reduction, as per the government of Eswatini's expectations.

The objective of this study is to provide an analysis of whether the use of limited Eswatini government resources to fund LUSIP has been effective in its stated objectives of poverty reduction and increased food security. This survey is the first of its kind in that it provides a baseline with regard to the effects of LUSIP on the Siphofaneni community. Conducting a baseline impact assessment is important, as it will provide tangible evidence on the factors that have led to economic and social changes attributed to LUSIP in terms of job creations and employment, increased food security, social development and other economic,

social and environmental impacts. Future research on LUSIP can use the results from this baseline survey as a starting point to create a time series of the effects of investment in infrastructure projects such as LUSIP. Further, the results of this survey can provide the government of Eswatini a foundation to build upon for future funding decisions regarding LUSIP and other large-scale infrastructure programs in Eswatini. As droughts become more frequent and more intense, countries like Eswatini, whose livelihood is based on the use and capture of rainfall, will face increased food insecurity if projects like LUSIP are not undertaken in an attempt to mitigate the effects of drought. This study attempts to provide tangible data on how effect LUSIP was on increasing the availability of water to the citizens of Eswatini and how the increase of water availability can increase livelihoods with regards to all three components of sustainability; economic, social and environmental.

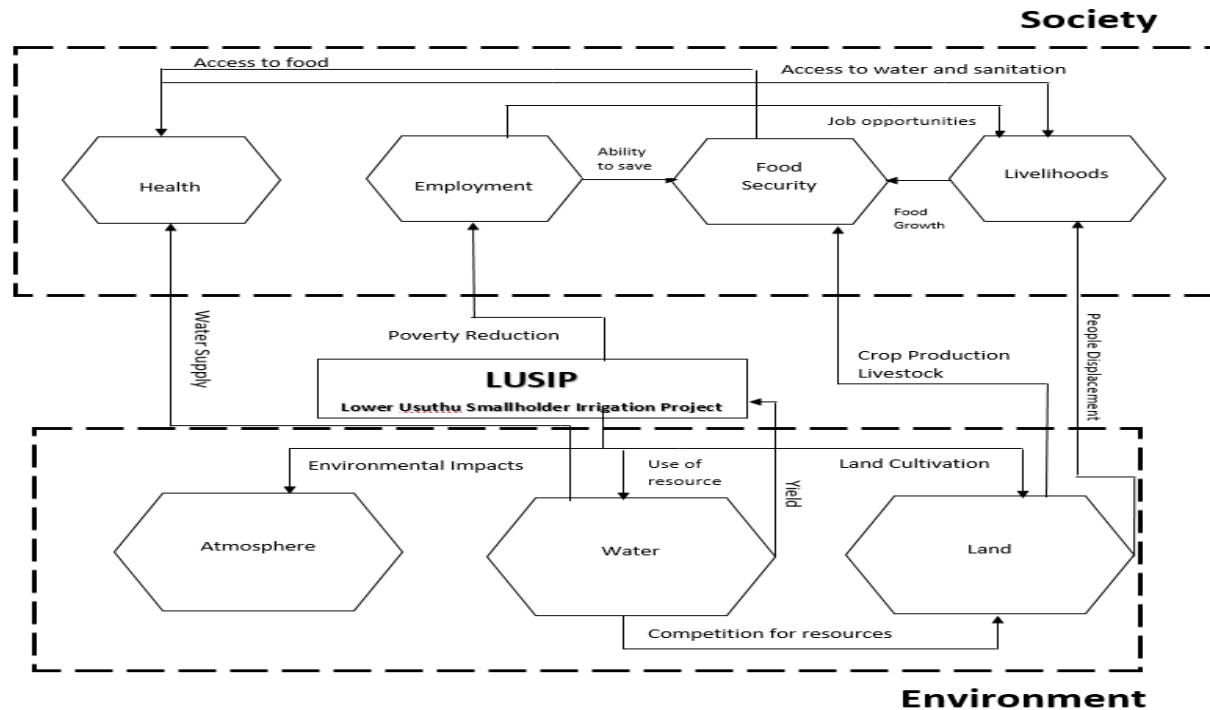


Figure 3: Impact of LUSIP on the society and environment

Data analysis, presentation and interpretation

This chapter provides summary of the data collected. The chapter is organized in sections; first are the survey responses, followed by the findings as per the objectives of the study. The findings are explained using percentages and figures in tabular form and in description form.

Survey Design and Implementation

This survey was designed by the SEPARC research team to ensure that the questions asked were inclusive of all data necessary to assess the socioeconomic impacts of LUSIP on the residents of Siphofaneni. The survey went through an iterative process with the members of the SEPARC team to ensure its holistic nature. After the final design of the survey, an IT specialist was asked to develop the survey as an e-survey so that the researchers conducting the survey could use tablets for data collection.

The survey was conducted in March of 2018 over a period of 5 days. A team of six researchers traveled to Siphofaneni to administer the survey. The team included an associate researcher, two graduate interns, two undergraduate student interns, and a data specialist. The original language of the survey was English; however, the researchers translated some questions for the respondents to SiSwati to further clarify and explain the questions or because the respondents did not speak English.

Demographics of the survey participants

Gender of the survey participants

Of the 265 participants surveyed, 56.6% (or 150) were female while 43.4% (or 115) were male. While not completely representative of the Eswatini demographics this breakdown between males and females was an approximate representation and was a function of convenience sampling rather than random stratified sampling. In Eswatini the male to female ratio is at level of 94.01 males per 100 females (World Bank, 2017). Thus males are somewhat underrepresented in this survey sample.

Education level of respondents

Early Childhood Care and Education (ECCE) is the foundation of effective human resource development and helps ensure that every child is enabled to achieve their full potential. ECCE has shown to give the high returns on human capital development; based on this, Eswatini has continued to prioritize ECCE introducing the Free Primary Education Programme (FPE) in 2010 for Grades 1 and 2 only. This was brought about by the Constitution of the Kingdom which declared education a right (SMoET, 2015).

The Kingdom of Eswatini instructed that the FPE begin in 2009 which increased the demand for primary education, however, due to financial and other infrastructural requirement the government could only introduce the programme in 2010 (SMoET, 2015). As a consequence, an FPE Act was established which created an enabling environment for all Swazis to access primary education. The FPE Act of 2010 also adjusted the entry requirement from age 6, to a range of 6 – 9 years for Grade 1 to allow for older children who could not afford to pay for fees to enroll (GoKS, 2007).

Table 1 presents the distribution of respondents by education level while Table 2 breaks down those with no formal education by age group. No Education represents those respondents who did not attend school and did not receive any other forms of formal trainings; Primary Education indicates that the respondent attended school from grades 1 through 7, Lower Secondary Education indicates that the respondent attended school completing up to grade 9, and High School education indicates that the respondent has completed all 12 grades of the formal Eswatini schooling system. Completing high school and obtaining a bachelor's degree was also listed in the levels of education. Trade and Technical Training indicate that the respondent attended technical school for vocational training such as car mechanics, communication technology, and hospitality and received a certificate enabling them to work in such fields. Other levels of education refer to the respondents having attended some levels of schooling but have not completed the primary level or have not received any forms of training.

Table 1: Respondent Education Level

Educational Level	Frequency	Percentage
No Formal Education	61	23.0%
Primary Education	55	20.8%
Lower Secondary Education	55	20.8%
High School Education	44	16.6%
Bachelor's Degree	5	1.9%
Trade or Technical Training	9	3.4%
Other Levels of Education	36	13.6%

The findings in Table 1 also compliments the Eswatini's FPE ages whereby 58.2% of the respondents fall between the categories of having primary, lower secondary, and high school education. The government provides free primary education. However, almost a quarter 61 (23%) of respondents had not received any formal education. Therefore the survey data were filtered to count only the respondents who have not received any education and who are above 17 years of age, and presented in Table 2.

Table 2: Distribution of Respondent with no formal education

No Education by Age Group	Frequency	Percentage
18 to 24	1	1.6%
25 to 34	6	9.8%
35 to 44	5	8.2%
45 to 54	12	19.7%
55 to 64	27	44.3%
65 and Above	10	16.4%

The result of the data filtering showed that 98.4% of the respondents with no education are older than 24 years which indicates that the vast majority of those respondents were already passed the age of primary education and too old to be part of the FPE programme..

Table 1 indicates that over half 154 (58.2%) of the respondents are within the primary, lower secondary, and high school education levels. When the researchers from SEPARC were conducting the survey, respondents often indicated that the jobs they have or that are found around the town of Siphofaneni do not require an education levels greater than primary or secondary; these jobs do not require more than basic literacy and elementary knowledge, depending only on basic mathematic skills to count money and reading and writing.

Household Livelihoods Status

The area of focus of this study was household livelihood in the town of Siphofaneni focusing on how livelihoods have changed since the implementation of LUSIP, after 2009. To assess the livelihood status, this study defines livelihood such as whether the respondents are generating income in order to afford basic needs and services, and if so, what is the source of income and in what fields are the respondents involved in after the implementation of LUSIP, after 2009.

Income status

The study sought to identify the current source of income of the households, determining whether the respondents are employed, have their own business, or if the respondents are unemployed meaning that they are not generating income and are dependent on other family members or government services. Questions regarding employment were important since eSwatini has a 28% unemployment rate and one of the goals of this study was to analyze if LUSIP played a role in creating job opportunities for the inhabitants of Siphofaneni (World Bank, 2017). The findings of the respondents' sources of income are represented in Figure 4 below.

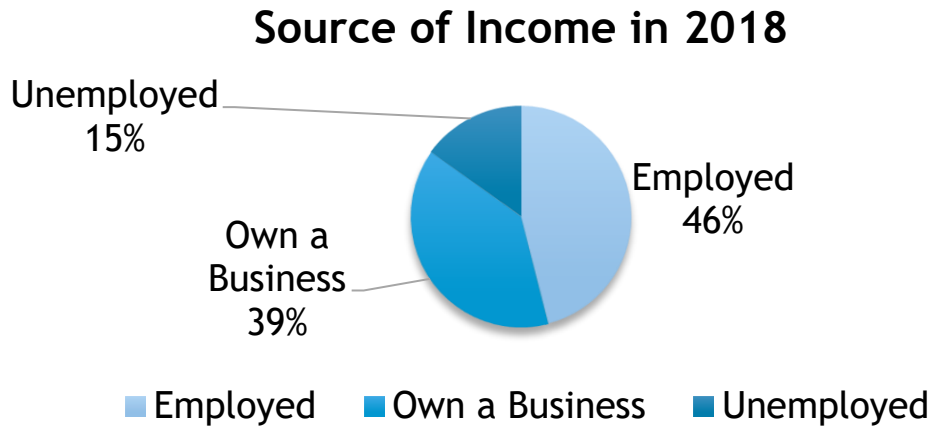


Figure 4: Respondents' source of income in 2018

When asked about their current source of income, 46% of the respondents said that they are employed by others, 38.9% are small business owners, and 15.1% are unemployed compared to the 28% total unemployment rate in Eswatini (CIA, 2017). Some of the employed respondents mentioned to the survey implementers that their employer/ the business owner are located in a big city in Eswatini such as Manzini or Mbabane. The business owners in the big cities have higher incomes which enables them to afford purchasing stores in Siphofaneni and employ someone to run the business while they continue to work in other cities. These respondents and businesses were mostly located in the center of Siphofaneni where recent economic centers started emerging after the completion of LUSIP.

As for the respondents who said they own their own businesses, 62% of them said that they are members of cooperatives that would help them register in the Eswatini Registrar of Companies and they would share a license to operate whereby they pay a small membership fee ranging from 2 to 50 emalangeni (\$ 0.16 to \$3.96) depending on the size of the cooperative. These businesses, with 97.2% of the respondents, are run by the owner himself/herself or employ

less than 10 employees leaving 2.8% of the business owners employing between 10-50 people.

With most of the businesses (97.2%) having less than 10 employees, this classifies the businesses in Siphofaneni as small business and the area as developing and growing.

The unemployed respondents, 15.1% (40), provided different explanations for why they are unemployed. Some said that they were employed during the construction of LUSIP and when the construction of phase 1 was over they were unemployed and unable to find other jobs in Siphofaneni. Others respondents indicated that they graduated from high school and cannot find any jobs. There were also a number of respondents that said that they do not have to work for they are the ones who receive the shares from the LUSIP project. The shares that people receive are from farmer companies that rent out the land of the family for agricultural purposes, mainly sugar cane plantation, and pay the head of the family share certificates for their land.

Income generating activities

This study further investigated how the completion of Phase 1 of LUSIP affected the income of the households in Siphofaneni. The survey administered questions regarding the income generating activities in which the respondents are currently involved. The employment sector under the income generating activities refers to the fields in which the employed respondents are working. The business sector under the income generating activities refers to the field or area of business under which the business owners operate their businesses.

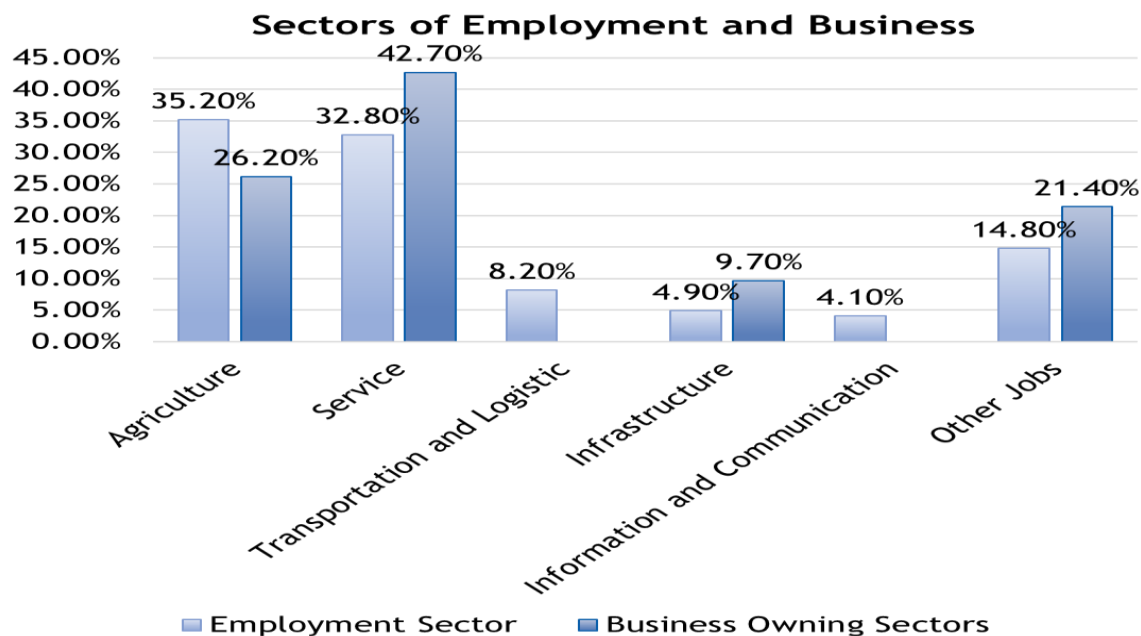


Figure 5: Sectors of employment and businesses in 2018

As presented in Figure 5, a total of 35.2% (43) of those who said they were employed stated they worked in the agricultural sector and specifically in the sugarcane plantation located in and around Siphofaneni, and 32.8% (40) of the employed respondents are involved in the service sector. The service sector in Siphofaneni revolves around food outlets such as small shops that sell packed fruits and vegetables or other food vendors, and cloth retailers. Other employment sectors included 8.2% (10) in the transportation sector, whereby the respondents were employed in the public transportation services, 4.9% (6) in the infrastructure sector whereby the respondents are employed in the construction of the second phase of LUSIP and other infrastructure constructions such as roads in the area, and 4.1% (5) in the information and communication sector whereby the respondents were employed by the two telecommunication companies in Eswatini, MTN and SwaziMobile, as street vendors. Other jobs that employed 14.8% (18) included the banking and finance sector, whereby the respondents were employed in

the banks and microfinance institution (Fincorp) that are located in mid-town Siphofaneni, and medical sectors mainly the pharmacies that are also located in mid-town.

As for the business owners, 26.2% (or 27) of the respondents indicated that they participate in agriculture varying from sugarcane producers, banana growers, and respondents who have small vegetable and fruit gardens that sell their produce in town. The 42.7% (or 44) of respondents who have businesses in the service sector, the business include food outlets, clothing retailing, car repairs, welding, hair salons, beauty salons, and child care taking. The 9.7% (10) who are involved in the construction and infrastructure sector have their businesses in block making and contractors for construction. The remaining 21.4% (22) of businesses were unstable temporary businesses such as bread baking and juice making that the respondents will do on temporary basis to earn seasonal income.

To investigate the impact of LUSIP on the diversity of the economic sector and identify whether jobs that people are currently employed in were available prior to or after the completion LUSIP, the respondents were asked whether similar businesses existed before 2009 or emerged after 2009 and the completion of LUSIP. A total of 51.5% (or 116) said that similar businesses did exist; however the majority indicated that these businesses were not as abundant prior to 2009. This left 48.5% (109) indicating that similar businesses did not exist before LUSIP, these respondents had different positions whereby some said that they had no knowledge about similar businesses existing in Siphofaneni prior to the completion of LUSIP. Conversely, some of the respondents who said that these businesses did not exist prior to 2009 stated that these new businesses were recently introduced to Siphofaneni such as welding, building construction blocks, and car mechanics as a function of LUSIP.

Employment prior to and after LUSIP

To further investigate how the completion of LUSIP affected the income of the households this study included follow up questions to determine if employment or the creation of new employment opportunities took place after 2009 and the completion of LUSIP. They catalyst of this question was to help establish if the construction of LUSIP had a direct effect on job creation.

The findings indicate that 79.1% (or 178) of the total respondents, both the employed by others and business owners, said that they were formally employed after 2009 after LUSIP was fully constructed and functioning identifying that prior to 2009 they were working part-time jobs or whatever comes in the way in order to make means and ends meet. These 79.1% (178) rationalized their employment post-LUSIP in two manners. First, was that the business that they are currently employed in were not prevalent before 2009 and after the completion of LUSIP in 2009 these businesses increased in number due to the increased demand of the people to these businesses such as food outlets, supermarkets, clothing retailers, and pharmacies. Second, these businesses did not exist before 2009 meaning that with the completion of LUSIP new businesses emerged in Siphofaneni that did not exist in the area before increasing the local economic diversification.

These newly created businesses included things such as welding stores, car washes, and stores that sold blocks for construction. It is also important to take into consideration that out of the 79.1% who said they were employed after 2009, 15.1% of them are below 25 years thus where under the employment age before 2009. These respondents were counted as unemployed before 2009 during the survey, but denoted as too young to be employed at that age when

discussing the findings. As for the 20.9% (47) who responded that they were employed prior to 2009 they were mostly involved in the agricultural sector. These respondents indicated that agriculture was the most dominant sector prior to the completion of LUSIP even though it was not as productive as the agriculture today due to the increased amount of water provided by LUSIP.

Effects of LUSIP on household livelihood status

The survey sought to examine the effect of LUSIP on household livelihoods in Siphofaneni, and included questions regarding the effect of LUSIP on access to food, water and water sanitation, crop production, livestock, education, health, social life, crime rates, environment, the respondents' personal life, and effect of LUSIP on the Siphofaneni community.

Table 3: Effects of LUSIP on household livelihood status

Impact of LUSIP on :	Positive		Negative		No Impact	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Access to Food	161	60.8%	52	19.60%	52	19.60%
Water & Water Sanitation	155	58.50 %	54	20.40%	56	21.10%
Crop Production	124	46.80 %	110	41.50%	31	11.70%
Livestock	87	32.80 %	133	50.20%	45	17.00%
Education	157	59.20 %	26	9.80%	82	30.90%
Health	124	46.80 %	23	8.70%	118	44.50%
Social Life	148	55.80 %	72	27.20%	45	17.00%
Crime Rates	69	26.00 %	130	49.10%	66	24.90%
Environment	109	41.10 %	81	30.60%	75	28.30%
Respondents Personal Life	176	66.40 %	26	9.80%	63	23.80%
Community as a Whole	235	88.70 %	13	4.90%	17	6.40%

The findings of Table 3 show that when asked about the impact of LUSIP on the access to food, the majority of the respondents, 60.8% (161), said that the impact of LUSIP was positive listing such things as the creation of new supermarkets and food outlets being opened after the completion of LUSIP. As such the local population could access these services, and in addition to the new food outlets, the increased access to water allowed the inhabitants to grow their small vegetable gardens in their backyards increasing their food supply. However, 19.6% (or 52) had negative perceptions of the impact of LUSIP on the access to food, whereby many respondents said that they were not able to afford the new supply of food, specifically the respondents who were single women who work near the agricultural fields of sugarcane or banana selling food products. These respondents indicated that in the dry season, which extends from mid-April to mid-October, they are only able to afford food for one meal a day or even one meal over three days to feed themselves and their children; however, in the previous years before LUSIP the competition for food, and thus food price, was not as high resulting in lower staple food prices. Other respondents who indicated that LUSIP negatively impacted access for food were households with more than 7 dependents saying that after LUSIP, the price of basic needs and necessities has increased and as such they cannot afford diets like other households, such as an increase in animal protein and vegetables. Another 19.6% (or 52) said that LUSIP had no impact to their access to food; the majority of these respondents were individuals not responsible for the food or grocery shopping in their household.

When asked to assess the impact of LUSIP on water and water sanitation in terms of the access to water and the quality and cleanliness of water delivered to the households, 58.5% (or 155) of the respondents said that LUSIP had a positive impact on water and water sanitation. The reason given was the increased availability of water for the sugarcane and other agricultural

practices. In addition, LUSIP built water canals throughout town which increased household water access and increased the ability for livestock to drink in more places. Conversely, 20.4% (or 54) of the participants of the survey said that the impact of LUSIP on water and water sanitation was negative because the water was not accessible to all the households in the city, and the taps that SWADE installed to deliver water to some households were not functioning. These participants added that some of the additional water is resting in ponds and the ponds are now filled with bacteria, making them unsafe for the inhabitants to drink from or swim in. The 21.1% (or 56) of respondents who said that LUSIP had no impact on water and water sanitation justified their answer by saying that even though LUSIP has some positive impacts it too has negative impacts making its net impact a neutral impact.

Participants indicated that the impact of LUSIP on agricultural crop production had both positive and negative effects. Of all participants, 46.8% (124) of the respondents said that LUSIP had a positive impact on crop production since more agricultural activity was witnessed in Siphofaneni after the completion LUSIP, especially in the highly profitable sugarcane production. Furthermore, the introduction of banana plantations by SWADE and the ability of the inhabitants to grow their own vegetable gardens at home with increased access to water through taps that have been installed by SWADE around the houses in Siphofaneni increased total crop production. The respondents who thought LUSIP had a positive affect mentioned that LUSIP allowed them to increase their income through higher and more diversified agricultural productivity. In contrast, 41.5% (110) said that LUSIP had a negative impact on crop production due to the fact that the people of Siphofaneni now are requested by SWADE to have water permits in order to legally irrigate their land. Further, the water permits are only given to farmers who are producing sugarcane, limiting the ability to access water for small garden agricultural

production. Moreover, the people in sugarcane production and many producers who grew non-sugarcane crops are now replacing them with sugarcane due to the economic incentives, eliminating the once abundant agricultural diversity. The remaining 11.7% (31) who said that LUSIP had no impact on crop production were typically those respondents who were not involved in or not interested in the agricultural sector or the agricultural activity in Siphofaneni.

Cattle in Eswatini are traditionally raised under open-access grazing systems grazing on common pastures at no cost to the cattle owners (Mdluli, 2014). Through the addition of irrigation water brought via LUSIP and the possibility of converting pasture land into cultivated crop production it was important to analyze the effects of LUSIP on the livestock industry. Of all participants in the survey, 32.8% (or 87) said that LUSIP had a positive impact on livestock primarily because after the completion of the dam people could afford to purchase more livestock through increased agricultural incomes. Furthermore, those who indicated that LUSIP was good for cattle production said that water canals built by LUSIP provided a drinking water source for the cattle. The respondents who indicated that LUSIP had a positive impact on livestock indicated that there has been an introduction to other livestock than the traditional cattle such as the emergence of piggeries. The slight majority of the respondents, 50.2% (133), said that LUSIP had a negative impact on livestock production for several distinct reasons. The main reason for the negative responses was the loss of grazing area which was caused by both the construction phase of LUSIP and the intensification of sugarcane production, other reasons include the loss of space to place the cattle therefor people are shifting to smaller livestock such as chicken and goats. A remaining 17% (45) of the 265 respondents said that LUSIP had no impact on livestock production.

Given the fact that education is an important aspect in the Millennium Development Goals of the UNDP and the Government of Eswatini has set a free primary education program, it was important to assess what/if any impact LUSIP had on education. The majority of respondents, 59.2% (or 157), said that LUSIP had a positive impact of education which was a function of the construction of new schools in the area brought on by economic growth through LUSIP. Conversely, 9.8% (or 26) said that education was negatively impacted by LUSIP. They stated that while the new schools being built were a positive for the community, the fact that lower secondary and high school education is not free, meant that the poor could not afford to send their children regardless of whether the schools were new or not. Other comments for negative assessments of education came by saying that the government should also provide free stationary and uniforms to the students and not just the free education. The remaining 30.9% (or 82) said that LUSIP had no impact on education and shared some of the same sentiments as those who responded negatively that they were hoping that the education gap between rich and poor would have diminished. That being said, those who said there was no effect on education did say that they thought that the government has done its responsibilities in building schools and providing the FPE program.

When asked to assess the impact of LUSIP in terms of access to health services, health awareness campaigns, and the general well-being of the Siphofaneni inhabitants, 46.8% (or 124) of the respondents said that there was a positive impact. The positive assessment was explained due to an increase of new pharmacies, the increased availabilities of pharmaceutical drugs, and the emergence of new health facilities in town. In addition to the HIV awareness campaigns that SWADE and the government administered such as prevention methods of HIV. People who thought that LUSIP positively affected general health in the area also stated the inhabitants also

got healthier with access to drinkable water (due to a reduction of water borne diseases such as diarrhea and dysentery) after the completion of LUSIP. Respondents also indicated that with LUSIP they are able to have a diversified diet all-inclusive of vitamins and protein enabling them to be more productive with a better health. A total of 8.7% (or 23) respondents said that LUSIP had a net negative effect on health and those respondents said that the health situation in Siphofaneni has deteriorated after LUSIP due to the increased amount of toads and bacteria in the water. These respondents also mentioned that they have no access to other sources of drinking since the taps that were installed by SWADE are dry and many are not functioning, those respondents were mostly located in the rural part of Siphofaneni. The remaining 44.5% (or 118) said that LUSIP had no impact on health because even though health facilities emerged in the town, they are still too far from the reach of rural Siphofaneni households.

The respondents were also asked to assess the social life in Siphofaneni after LUSIP in terms of the interaction between the town inhabitants and social activities in and around Siphofaneni. Of the total sample, 55.8% (or 148) said that LUSIP had a positive effect on the social life since agricultural and business cooperatives started forming allowing the inhabitants to work together in addition to the emergence of new churches and other places that the people gather at for social activities such as bars and restaurants. However, 27.2% (or 72) said that there was a negative impact from LUSIP on the social life specifically due to the unequal distribution of shares and credits of land distributions from local chiefs and farmer companies which could often cause tension between family members. Respondents further explained that only the male head-of-household can receive the share from farmer companies for renting their land, and can choose not to distribute the shares to other family members. In some cases, the member who the share is transferred to is located in another town in, or even outside of, Eswatini. Therefore the

money that the shares create may not benefit the family directly. Another reason for the respondents indicating that LUSIP had a negative effect on their social life is due to the fact that some children have recently drowned in the newly created canals by LUSIP creating potential hazards for the community at large. A remaining 17% (45) said that there is no impact from LUSIP on the social life whereby everything remained the same from before LUSIP noting that the people of Siphofaneni were always living together through all social situations, good and bad.

Another relevant social factor is changes in crime rates brought on by LUSIP. Ideally, higher incomes, and thus higher tax revenue, could be used for increased police presence. Conversely, increased incomes could also increase crime as criminals may see the increased income of others as an opportunity for themselves. With changes in crime in mind, one of the questions included in the survey was whether LUSIP had a positive, negative, or no impact on crime rates. The respondents confirmed the assumption of increased crime rates with almost half of the respondents, 49.1% (130), saying that LUSIP had a negative impact on crime rates. The respondents explained that the crimes have increased in Siphofaneni when the shares that the farmer companies pay the head of the households for the land taken for sugarcane plantation are distributed, whereby at the beginning of every month inhabitants from neighboring town are aware of the dates of distribution so criminals anticipate payment and crime increases at this time. Additionally, the sugarcane farmers in Siphofaneni are better off financially than other farmers or inhabitants with other businesses which make them an increased target for robbery. A reduction in crime rates were reported by 26% (69) of the respondents which could be explained by the presence of newly created police forces in the town of Siphofaneni who are working on

increasing the overall safety of the inhabitants. Almost a quarter of the respondents, 24.9% (66), stated that LUSIP had no effect on crime rates.

The environment plays a large role in each decision the government of Eswatini undertakes with regards to policy given the scarce resources, specifically water, it was endowed with. When asked to assess the impact of LUSIP on the environment, 41.1% (109) of the respondents said that the impact of LUSIP was positive due to the awareness campaigns that SWADE administered about the importance of water conservation, soil degradation in farming, and other informational session pertaining to the efficient use of water and land maintenance. However, 30.6% (81) of the respondents said that the net impact on the environment was negative due to the increase in the amount of dust and emissions that cars caused due to the increased traffic on untarred roads, increased cane burning after harvesting, and the also the pollution that is caused by the construction of the second phase of LUSIP. There were 28.3% (75) of the respondents that saw that there was no impact on the environment.

With LUSIP having an impact on the livelihood of the people, it was important to ask whether LUSIP had an impact on the personal lives of the respondents, in terms how the completion of LUSIP impacted of the respondent's life from finding a job and being more involved in the society. The majority of the respondents, 66.4% (or 176), said that LUSIP had a positive impact on their personal life, with some explaining that LUSIP helped them find a job, provided enough additional income to get married, and most importantly an increased ability to take care of their families. Other positive feedbacks noted by participants were the ability to buy household necessities that they could not afford previously such as beds, electricity, and more diverse diets such as meat and vegetables. However, 9.8% (26) said that LUSIP had a negative impact on their personal life whereby they were doing better financially and emotionally before

LUSIP, explaining that with LUSIP came an increased competition and social pressure amongst the inhabitants on who gained the most or who got better job opportunities which impacted the trust that the people had between them. The remaining 23.8% said that LUSIP had no impact on their personal life for they have not witnessed any changes after LUSIP.

As a summary question the participants were asked to rate the impact of LUSIP on the community as a whole. The majority of the respondents, 88.7%, said that LUSIP had a positive impact on the community supporting that with many examples, such as more investments in services and social developments, and importantly that LUSIP has helped the Siphofaneni people gain the attention of the government in terms of development investments. A small number of respondents, 4.9%, said that LUSIP had a negative effect on the community since it increased rivalries and decreased social capital amongst the people and among family members. Out of the 265 respondents, 6.4% said that LUSIP had no impact on the community.

LUSIP and services provided in Siphofaneni

This study wanted to investigate whether LUSIP had contributed to new investments in services in the Siphofaneni area. This part of the study attempts to analyze the hypothesis that the researchers at SEPARC had that “with the increase of the people’s income in Siphofaneni, investors will be drawn to the area to invest in services and the people will also be able to afford these services through higher incomes brought by LUSIP”. In that matter, the respondents were asked whether they have seen the services mentioned in the survey emerge after 2009. The findings in Figure 6 below show the list of services that were mentioned in the survey and the number of respondents that have witnessed these services emerge after 2009 and the completion of LUSIP.

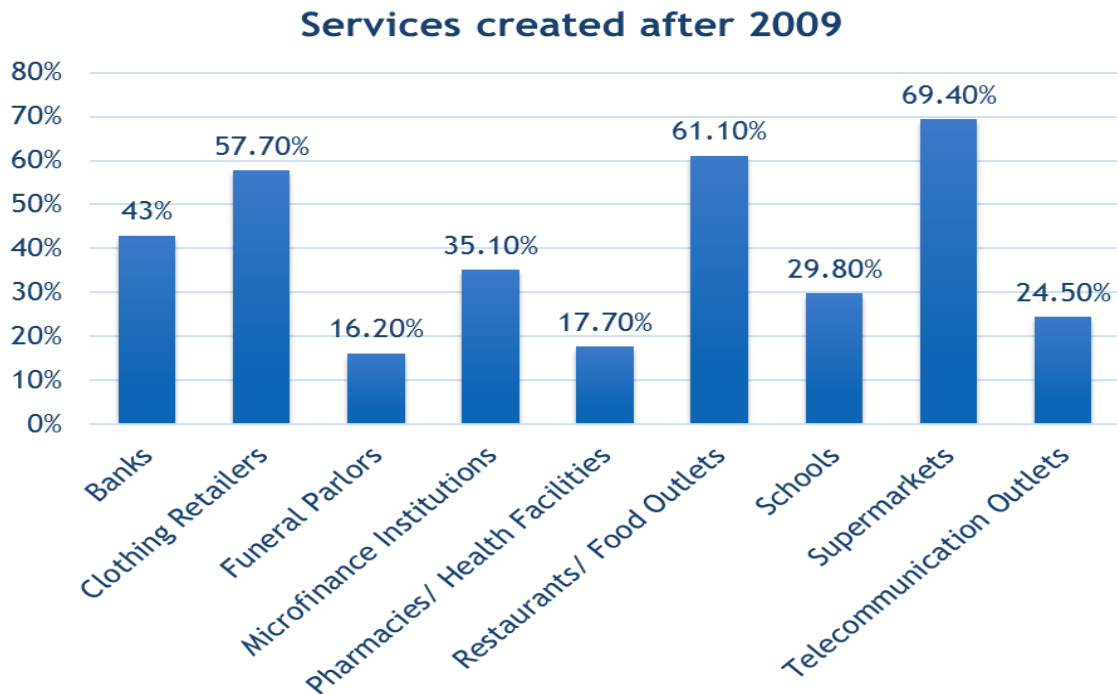


Figure 6: Services that emerged after 2009

When asked about the emergence of banks in the town of Siphofaneni, 114 respondents said that they have seen new banks emerging after 2009, 93 participants said that new microfinance institutions started in the area after 2009, 47 said that pharmacies/ health facilities have emerged after 2009, 79 said that new school facilities have emerged, 43 said that they have witnessed the emergence of funeral parlors after LUSIP, and 65 respondents said they have seen new telecommunication outlets spread in Siphofaneni after 2009.

The majority of the respondents (184) said that supermarkets or stores were constructed after 2009, the second highest response was restaurants and food outlets whereby 162 respondents said they have seen such service emerge after 2009 around Siphofaneni, and the third most popular service that emerged after 2009 was clothing retailing with 153 respondents witnessing such service spread around town. The fact that these services are now more readily

accessible to the inhabitants of Siphofaneni could mean that the lives of the inhabitants could be made easier and possibly better off. While these conjectures are mere correlations it would stand to reason that on a societal level the introduction of banks and other services should increase the overall welfare of a community.

Reasons for businesses to emerge after LUSIP

With different businesses from various sectors emerging in Siphofaneni after LUSIP, this study was interested not just if these services emerged but also what were the main drivers for these services to emerge. In order to get the perspective of the inhabitants about why businesses emerged in Siphofaneni, all respondents were asked, in their opinion, about the main drivers for businesses emergence in Siphofaneni. In the survey, the respondents were provided with four options; the first option was the increased purchasing power of the people of Siphofaneni allowing them to spend on more than just necessities, the second option was increased demand on the products each new company was originally selling such as food and basic needs, and the third option was the increased number of people in the area creating a need to increase service providers to satisfy the need of more people. In addition to these three options the respondents were given the option to fill in another reason that they consider more relatable for these increased services. The findings of the respondents' answers are shown in Figure 7.

Main Drivers for Businesses to Start After 2009

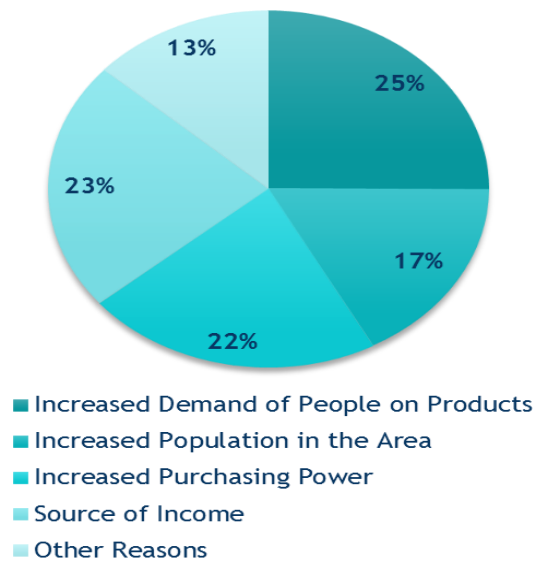


Figure 7: Main drivers for businesses to start after 2009

According to the respondents the main reason for businesses to develop after the completion LUSIP was the increased demand of the people for products, 27.6% of respondents who stated that this was their primary option since the people had maize and peanuts as their main diets and after LUSIP they have shifted their diets to consume more vegetables and meat which drove food outlets that braai meat (beef or chicken) to increase their supply, increase the number of vegetable vendors, and led to the emergence of supermarkets around town. Another reason, with 24% (54) of respondents was the increased purchasing power of the people of Siphofaneni. Respondents explained that their income increased after LUSIP through an increase in job opportunities which allowed them improve their households with such things as installing electricity, tile the floor, purchase furniture, and spend on items that are not their very basic needs such as food. All of these increases in demand led to the emergence of new businesses. The third reason was the increased number of people in the area with 18.7% (42), whereby the

respondents mentioned that with LUSIP advertised, by the government and SWADE, to enhance the situation in Siphofaneni, this attracted many inhabitants of neighboring towns to move to Siphofaneni in hope of finding a job in which ultimately boosted the economic activity in Siphofaneni

An open-ended answer was also provided to respondents to address why they thought business had emerged in Siphofaneni after 2009. A total of 15.1% (34) of the respondents indicated that people's main driver to provide services or have their own business is so they can have a consistent and stable source of income. Respondents further explained that when people see someone with a similar business doing well financially or at least making enough money to support their family will be motivated to do the same. Other 14.7% (33) said that other reasons include the new emergence of businesses that did not exist before 2009 such as funeral parlors which is likely a function of the larger population.

Impact of LUSIP on respondents' livelihoods

After assessing which business emerged and why they emerged this study then pivoted to see how these newly created services impacted the livelihood of the respondents in the town Siphofaneni. To assess this impact the survey included questions such as whether the respondents have witnessed an increase in job opportunities after 2009, whether respondents were able to save (in any form: bank, purchasing livestock, or investment of any kind) after 2009, whether the respondents could commute to neighboring villages more easily to obtain their needs or were they able to now find those need such as foods or household items in Siphofaneni after 2009, whether the respondent's consumption of animal protein increased after 2009 with their increased income, and also if the respondent's consumption of vegetables has

increased after 2009 for the increased availability of such products. The findings in Table 4 show whether the respondents witnessed impacts on certain aspects of their livelihoods after LUSIP.

Table 4: Impact of LUSIP on respondents' livelihood

	Yes		No	
	Frequency	Percentage	Frequency	Percentage
Witnessed an Increase in Job Opportunities After 2009	221	83.4%	44	16.6%
Able to save after 2009	117	52.0%	108	48.0%
reduced commute to neighboring village to obtain needs after 2009	183	69.1%	82	30.9%
Consumption of Animal Protein Increased After 2009	161	60.8%	104	39.2%
Consumption of Vegetables Increased After 2009	202	76.2%	63	23.8%

The results presented on Table 4 indicate that 83.4% (221) of respondents said that they witnessed an increase in job opportunities after 2009 with 16.6% (44) saying that no increase in job opportunities was witnessed. With an increase in job opportunities the study also wanted to

query the respondents if they were now saving more money than prior to completion of LUSIP. When respondents were asked whether they were able to save more, in any form including in banks and purchasing livestock, after 2009, 52% (117) said that they were able to save after 2009; meanwhile, 48% (108) indicated that their savings were not impacted by the completion of the LUSIP project stating that they were extremely poor before 2009 and after 2009. LUSIP may have created jobs and income for these respondents but given their initial income status they were still not able to save money for the future

This study assumed that with new services emerging in Siphonaneni after the completion of LUSIP these services would be able to satisfy the needs of the people of Siphofaneni limiting their need to commute to neighboring villages to obtain these needs. The majority of respondents 60.8% (161) said that their commute to neighboring towns for goods and services have decreased after 2009 since they can now find what they need in the new service providers and businesses that opened in Siphofaneni, leaving 30.9% (104) saying that they still commute for their needs for they have gotten used to it and they travel to see family and friends and purchase these goods while there.

The survey was also used to determine if the increased job opportunities and saving ability coupled with the new services emerging in Siphonaneni altered the food consumption habits of the inhabitants of Siphonaneni with regards to consumption of animal protein and vegetables. Table 4 indicated that 60.8% (161) of the participants said that their meat consumption had increased after 2009, these respondents stated that they can now afford consuming animal protein since meat is relatively less expensive now and previously they would only purchase it on holidays or celebrations. Conversely, 39.2% (104) respondents stated that their meat consumption after 2009 did not change stating that they can now afford consuming

more meat and vegetables but they would prefer addressing other urgent matters such as fixing their homes and purchasing household furniture. A change in diets does not only include a change in animal protein consumption but also the consumption of vegetables, a luxury good. The respondents were asked about their vegetable consumption with 76.2% (202) stating that their vegetable consumption has increased after 2009 since vegetables are now more accessible after LUSIP as the inhabitants are now able to plant their own small vegetable gardens with increased access to water associated with LUSIP. The other 23.8% (63) of respondents said that their consumption of vegetables remained unchanged after 2009 these opinions varied from some respondents saying that they are still poor and can't afford a change in diet to others who said that it was a personal preference.

General assessment of Siphofaneni before and after the completion of LUSIP

While many people benefited from LUSIP it is important to understand if they internalize these benefits were a function of the project itself. Moreover, it was important to assess if the participants were even aware the LUSIP was a government project under one umbrella.

When conducting the interview, the respondents were asked whether they have heard or have knowledge of LUSIP or SWADE in which 95.5% (253) of the respondents have heard of LUSIP and a remaining 4.5% (12) have not heard of LUSIP.

After determining whether the respondents had some knowledge of LUSIP, the questions that followed focused on the how the respondents rated their overall livelihoods in Siphofaneni before 2009 and then rate the situation in Siphofaneni after LUSIP was completed. The questions included the ranges from very bad to very good with the options of bad, neutral (acceptable), and good in between. The results of the assessment are presented in Table 5.

Table 5: General assessment of Siphonaneni before and after 2009

	Very Bad	Bad	Neutral	Good	Very Good
General Livelihood Before 2009	135	108	20	1	1
	50.90%	40.80%	7.50%	0.40%	0.40%
General Livelihood After the Completion of LUSIP	2	14	79	127	43
	0.8%	5.3%	29.8%	47.9%	16.2%

To conclude the research, the respondents were asked how they felt overall about holistic situation and livelihood in Siphofaneni, in terms of economic and social, before and after 2009 indicating that after 2009 specifically referring to the impacts of LUSIP on the town. Assessing the situation before 2009, 50.9% (135), said that situation was very bad and 40.8% (108) said that the situation was bad. These responses were explained by the participants through the extreme poverty that the people were witnessing in Siphofaneni with regards to limited access to water, relying on rain-fed agriculture, high unemployment rates, and poor living conditions such as mud houses and grass beds. A total of 7.5% (20) of the respondents said that the livelihood situation in Siphofaneni before 2009 was acceptable or neutral whereby the majority of these respondents said that the people had gotten accustomed to the living conditions and that lifestyle. However, there remained 0.8% (2) who argued that the situation in Siphofaneni was good and very good before 2009 or before LUSIP, these respondents said that no one had to be registered for water permits, and there was no intervention from anyone in the business of the people whereby the people were in full control of their livelihoods instead of SWADE intervening in campaigns and workshops in an attempt to change the lifestyle of the people.

When it came to assessing the general situation after 2009, the majority of the respondents were split between very good, 16.2% (43), and good, 47.9% (127), stating that the livelihood, economic and social situation after LUSIP has helped the people of Siphofaneni out of extreme poverty whereby they can afford purchasing food that constitutes a healthy diet, in addition to changes in their homes such as installing electricity, tiling the floors, and purchasing household appliances such as beds, refrigerators, and kitchen utilities. Of the total respondents 29.8% (79) said that the situation in Siphofaneni after the completion of LUSIP in 2009 is unchanged or acceptable. These respondents indicated that the livelihood, economic, and social situation in Siphofaneni after LUSIP improved, but these respondents see that there are a lot of gaps that remain unattended to by the government such as healthcare and free high school education. Some respondents also had strong negative reviews after the completion of LUSIP, where 5.3% (14) said that it was bad and 0.8% (2) said that is very bad. These negative were explained by the fact that LUSIP increased the competition between the inhabitants of Siphofaneni mainly in the sugarcane agriculture causing some people to burn the cane of others if they sense that they are doing better than them. Another reason for the negative perception is the safety of the LUSIP canals, since the inhabitants' livestock and children are drowning in the canals, in addition to the people being agitated with the SWADE heavy equipment causing dust emissions.

Conclusion and recommendations

The 2016 Eswatini Vulnerability Assessment Report indicated that over half of the Eswatinipopulation required livelihood support due to the severe El Niño drought. Since agriculture is the backbone of Eswatini's economy, investments in climate change mitigation are needed in order to help protect the agriculture sector and associated livelihoods from increased yield and profit variability associated with future droughts. The IPCC estimates climate change in Eswatinicould reduce rain-fed agricultural yields by up to 50%, threatening the ability of Eswatinito be food secure. As such, investing in water capture systems could help mitigate changes to both the amount and frequency of rainfall. Investments in water storage could be viewed as a type of food security insurance in the Eswatinicontext.

The Government of Eswatini commissioned the construction of the Lubovane Dam in 2003 to provide water, both for agricultural and household usage, as part of the Lower Usuthu Irrigation Project (LUSIP). LUSIP aimed to provide irrigation water for 11,500 ha by 2015. LUSIP was also forecasted to provide an additional 750,000-person day /year of on-farm employment mainly on sugarcane, banana, and maize fields and 36,000 days of non-farm employment/ year in the new businesses and services that would have emerged after its completion in 2010. Eswatini had to allocate limited public funds for the implementation of LUSIP and without tangible evidence on the returns on investment, obtaining funding or future irrigation projects could be in jeopardy. In that sense, one might say that the LUSIP was commissioned as an insurance program for low-medium income people around the town of Siphofaneni. Since Siphofaneni and the towns around it are lands susceptible to droughts and the inhabitants are main agricultural producers, the dam plays a huge role as insurance to the inhabitants around these areas against future droughts.

Through primary interviews with the people directly affected by LUSIP this study suggests that LUSIP has had a positive impact on the socioeconomic status of the livelihood of the vast majority of people living in the town of Siphofaneni. The general consensus amongst the people of Siphofaneni was that LUSIP has enhanced the livelihoods as well as the social and environmental realms of the town. The survey suggests that LUSIP has provided employment opportunities, increased wages and incomes, increasing the people's ability to save. The survey also found that the increased income and savings appeared to lead to increased food security as more people can now afford purchase their basic needs of foods. The survey results also indicated that the general health of the inhabitants has increased which was a function of having access to water and water sanitation along with the creation of new health facilities. Thus, LUSIP appears to have helped to directly prevent sickness (via clean and available drinking water) and indirectly treat sickness (through the creations of new health clinics). The survey found there was not unanimity with regards to the environmental impact of LUSIP. In terms of land use and land cultivation it was positive for the people who were more actively engaged in agriculture, specifically sugarcane production. Conversely, the construction and implementation of LUSIP was associated with a large increase in dust emissions in the town of Siphofaneni along with increased sugar cane burning causing pollution in the atmosphere. The survey showed that the respondents also had some negative assessments of LUSIP when it came to the crime rates and safety, and raising livestock. The respondents indicated that crime rates have increased specifically around the period that the dividends that individuals receive from large agricultural organizations for surrendering their land to them at the same time each month. Other comments from the people of Siphofaneni were issues regarding the loss of historic grazing areas for their livestock to sugarcane farmers.

Based on the findings above, this study recommends the following for the Eswatinigovernment and organizations involved in LUSIP:

1. With increased crime rates, it is recommended to increase police presence in and around the town of Siphofaneni. The police could be used to patrol the town for increased safety and security of the inhabitants and not just be responsible for road safety. The patrol is also advised to increase during the period when the inhabitants are expected to receive their dividends in order to limit and reduce the number of robberies that are centred on payday. This could be easily achieved with the coordination of the police station that is already present in Siphofaneni and the neighbouring towns.
2. Farmer companies should provide the shares in other forms of payment than cash, such as food vouchers or other needs of people such school uniforms, and vouchers for certain services such as recharging cards for phone credits, installation of electricity, housing blocks, and furniture. Scheduled cash payments have proven to make the inhabitants targets of robberies and crime therefore changing the form of payment or timing of the payment could help reduce general crime rates. This could be achieved by providing each recipient with an ID that they will use to identify themselves upon receiving the payments, and each payment is associated with an ID.
3. Install fences on the edges of the canals that passes near the settlements to prevent access by children and to prevent the drowning of all subjects. The fences could also prevent the pollution of the canals by avoiding drifting objects to fall in the canal such as leaves, sugarcane, or garbage that might be found on the floor.
4. Cattle in Eswatini is used to identify wealth and as a saving mechanism not focused on mass production such as milk and cheese. One suggestion would be to provide a stock

relocation program that will help the inhabitants move their cattle and livestock from Siphofaneni to other towns for grazing due to the loss of grazing areas in the town. The cattle can be tagged to identify the owners and follow a certain schedule for grazing. Another suggestion would be having a grazing area run by a resource management body (SWADE) that would provide a grazing area for the inhabitants following a grazing schedule by cow/area for a minimal fee for operation and maintenance.

Since this study covered the impact of phase 1 of LUSIP, a similar study is needed after the completion of phase 2 of LUSIP in 2020, which is an expansion of the first phase in terms of introducing new functions such as hydropower, to determine whether what the impacts are of the entire project. Another suggestion would be to conduct an inter-regional impact of LUSIP whereby a similar study in other affects areas besides Siphofaneni, to determine what, if any, spillover effects from the Siphofaneni area exist. Future research needs to focus on the changes in the prices of staple and luxury foods and other goods after the completion of all phases of LUSIP to study the impact of LUSIP on the general food security situation in Siphofaneni. In order to have a better understanding of the socio-economic impact of LUSIP on the livelihoods of the inhabitants of Siphofaneni, it is recommended that future researchers study the distance of services such as schools, pharmacies/ medical services, food outlets, supermarkets, and other services from the households; as the distance could symbolize the advancement of the town whereby the closer the services are to households the better the social and economic situation. Further research is also warranted regarding the potential benefits from government investment in further activities on LUSIP, such as the production of hydropower from the dam, or the production of biofuels from the sugarcane.

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Appendix



Economic Impact of Infrastructure Investment in Swaziland: Case of LUSIP³

The Swaziland Economic Policy Analysis and Research Centre (SEPARC) is conducting a study to understand the impact of government infrastructure investment on Swaziland. The study aims to document the impact of development and development practices in the region surrounding the LUSIP (Lower Usuthu Smallholder Irrigation Project) specifically the population of Siphofaneni in Swaziland, to identify the impacts of this infrastructure investment whether positive or negative for the purpose of reporting whether the government should continue in investing in infrastructure or not.

You have been identified as a key informant for this study; therefore your participation in completing the questionnaire is highly valuable and appreciated. This questionnaire is filled anonymously, whereby you are not required to provide your name, and any information provided will be held in strict confidence.

The LUSIP (Lower Usuthu Smallholder Irrigation Project) is a poverty alleviation initiative situated in the Lowveld of Swaziland. The Project has constructed three dams on the Mhlathuzane River, Golome River and a Saddle Dam to form an off-river storage reservoir to impound 155 million cubic metres of water harvested from wet season flood flows in the Usuthu River. The project's impacts and benefits were to start appearing in 2009.

1) What is your gender?

☐ Male

☐ Female

³ At the time the survey was administered eSwatini was known as Swaziland

2) What is your age?

- ☐ 12-17 years old
- ☐ 18-24 years old
- ☐ 25-34 years old
- ☐ 35-44 years old
- ☐ 45-54 years old
- ☐ 55-64 years old
- ☐ 65- older

3) What is your marital status?

- ☐ Single
- ☐ Married
- ☐ Divorced
- ☐ Widowed
- ☐ Single mom

4) How many dependents are in your households? (Including children, elderly, unemployed members, etc. ...)

5) What is the highest degree or level of school you have completed? *If currently enrolled, highest degree received.*

- ☐ No schooling completed
- ☐ Primary education (grade 1 through grade 7)
- ☐ Lower Secondary education (form 1 through form 3)
- ☐ Upper Secondary/ High School education (forms 4-5)
- ☐ Some high school, no certificate
- ☐ Trade/technical/vocational training/certificate
- ☐ Associate degree
- ☐ Bachelor's degree
- ☐ Master's degree

- ☐ PhD
- ☐ Some college credit, no degree
- ☐ other: _____

6) Are you employed?

- ☐ Yes
- ☐ No

If yes, answer question below; if no, go to question 7

A. What is your occupation sector?

- ☐ Agriculture
- ☐ Medical Sector (nurse, doctor...)
- ☐ Transportation and Logistics
- ☐ Information and Communication Technology
- ☐ Banking and Finance
- ☐ Service Sector
- ☐ Infrastructure
- ☐ other _____

7) If no, do you own any business at home, or do you receive any income by working at home?

- ☐ Yes
- ☐ No

If yes, answer question A below; if no, go to question 8

A. What work do you provide from your home?

- ☐ Service providing in the food sector (baking bread, jam making, drying foods ...)
- ☐ Service providing in the clothing sector (Seamstress, knitting,)
- ☐ Care taker of children
- ☐ Medical services (on call nurse, on call doula ...)
- ☐ Other _____

8) When did the business you are currently employed in (whether in an organization or personal domestic employment) start?

- ☐ Prior to 2009

☐ After 2009

9) Did a similar business to the one you are currently employed in exist before 2009?

☐ Yes

☐ No

10) What was the main driver for the business to start?

☐ Increased purchasing power of people allowing them to spend on more than just necessities

☐ Increased demand on the product the company was originally selling

☐ Increased number of population in the area

☐ Other _____

11) What are the **TWO** primary or prevailing occupations in that area?

☐ Agriculture

☐ Medical Sector (nurse, doctor...)

☐ Transportation and Logistics

☐ Information and Communication Technology

☐ Banking and Finance

☐ Service Sector

☐ Mining

☐ Infrastructure

☐ other _____

12) What are the secondary occupations in the area? (please select all applicable answers)

☐ Agriculture

☐ Medical Sector (nurse, doctor...)

☐ Transportation and Logistics

☐ Information and Communication Technology

☐ Banking and Finance

☐ Service Sector

☐ Mining

☐ Infrastructure

☐ other _____

13) Have you heard about LUSIP (Lower Usuthu Smallholder Irrigation Project) before this questionnaire?

☐ Yes

☐ No

The following questions are targeted towards assessing the impact of the project on the households of the region.

14) If you were employed before 2009, what was your monthly income level then?

- ☐ Less than E800
- ☐ $E800 \leq X \leq E1600$
- ☐ $E1601 \leq X \leq E2400$
- ☐ $E2401 \leq X \leq E3000$
- ☐ $E3001 \leq X \leq E3800$
- ☐ $E3801 \leq X \leq E4600$
- ☐ $E4601 \leq X \leq E5400$
- ☐ More than E E5400
- ☐ I was not employed before 2009

15) If you were employed before or after 2009, what is your current monthly income level?

- ☐ Less than E800
- ☐ $E800 \leq X \leq E1600$
- ☐ $E1601 \leq X \leq E2400$
- ☐ $E2401 \leq X \leq E3000$
- ☐ $E3001 \leq X \leq E3800$
- ☐ $E3801 \leq X \leq E4600$
- ☐ $E4601 \leq X \leq E5400$
- ☐ More than E E5400

16) Have you witnessed any increase in job opportunities after 2009?

- ☐ Yes
- ☐ No

17) With an assumption of income increases, how much money were you able to save annually after 2009?

18) With an assumption of income increase, what would you spend the extra money on?

Please select all applicable answers

- ☐ Buy agricultural inputs (fertilizers, hybrid seeds...)
- ☐ Purchase non-perishable foods (canned foods, dried foods...)
- ☐ Invest in the education of your children
- ☐ Purchase medical supplies (medicine, preventive supplies such as nets or insect repellants)
- ☐ Save this money for later use
- ☐ Other: _____

19) Assuming that the LUSIP had development impacts on the service sector in the region, has your commute to neighboring villages to acquire certain services been reduced or eliminated?

- ☐ Yes ☐ No

20) Please list 5 household appliances that you have purchased after 2009 that are other than necessities, such as electronics, furniture, and kitchen appliances (such as cutlery, silver wear, cups, plates, etc...).

21) Has your consumption of meat products increased after 2009?

- ☐ Yes ☐ No

22) Has your consumption or availability of vegetables increased after 2009?

- ☐ Yes ☐ No

23) In your opinion, what has been the impact of the LUSIP on the following variables?

Variable	Positive	Negative	No Impact
Access to food			
Water & Sanitation			
Crop Production			
Livestock			

Education			
Health			
Social			
Crime Rates			
Environmental Impacts			
personal change in your life due to LUSIP			
community change due to LUSIP			

24) Although the LUSIP, a dam that was built on the Usuthu River, is funded mostly by the government of Swaziland, how much would you assess your yearly benefit from this project?
(How much is the project worth to you annually)

- ☐ Nothing
- ☐ Less than E800
- ☐ $E800 \leq X \leq E1600$
- ☐ $E1601 \leq X \leq E2400$
- ☐ $E2401 \leq X \leq E3000$
- ☐ $E3001 \leq X \leq E3800$
- ☐ $E3801 \leq X \leq E4600$
- ☐ $E4601 \leq X \leq E5400$
- ☐ More than E E5400

25) Which businesses from the list below emerged in recent years or after 2009?
(select all applicable)

- ☐ Banks
- ☐ Micro-finance institutions
- ☐ Pharmacies or medical service providers (clinics, hospitals, ambulance services)
- ☐ Schools or technical training institutes
- ☐ Funeral Parlors
- ☐ Supermarkets

- ☐ Clothing retailers or stores
- ☐ Telecommunication
- ☐ Restaurants and food outlets

26) If other services and or businesses than the mentioned above emerged please mention them here:

27) Do you own a bank account?

- ☐ Yes ☐ No

If **Yes**, When did you acquire this bank account?

- ☐ Before 2009 ☐ After 2009

28) What financial services do you use or know of? (Please select all applicable)

- ☐ Mobile Money
- ☐ eWallet
- ☐ Stokvel
- ☐ Loansharks
- ☐ Credit and Saving Cooperatives
- ☐ Others: _____

29) How would you rate over 5 the situation in the Siphofaneni area before 2009? (1 being very bad, 5 as very good)

- ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

30) How would you rate over 5 the situation in the Siphofaneni area after 2009? (1 being very bad, 5 as very good)

- ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5